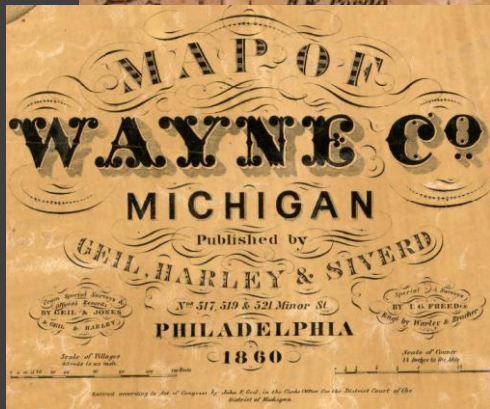
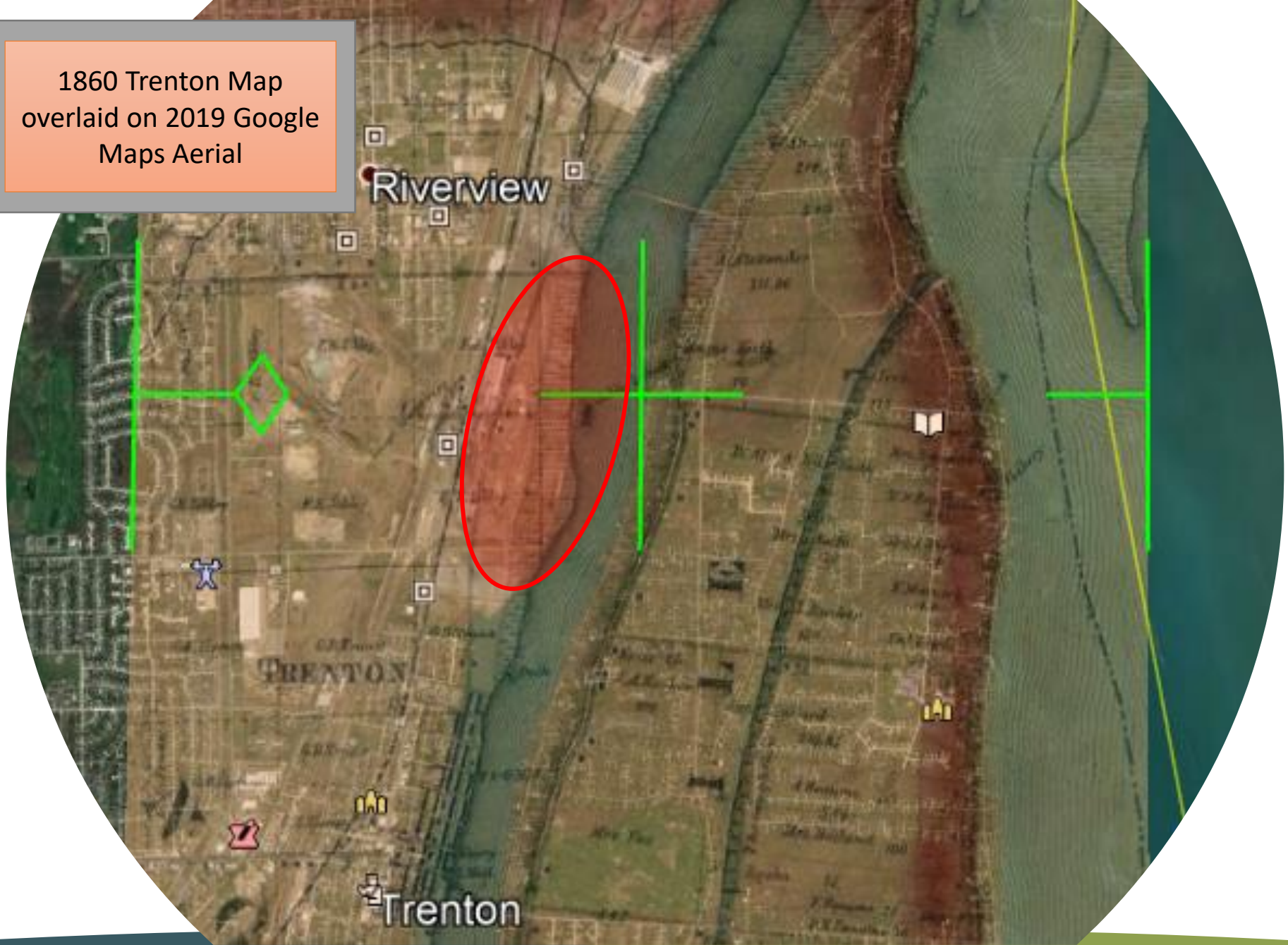


Trenton – Then and Now 1860 to 2020



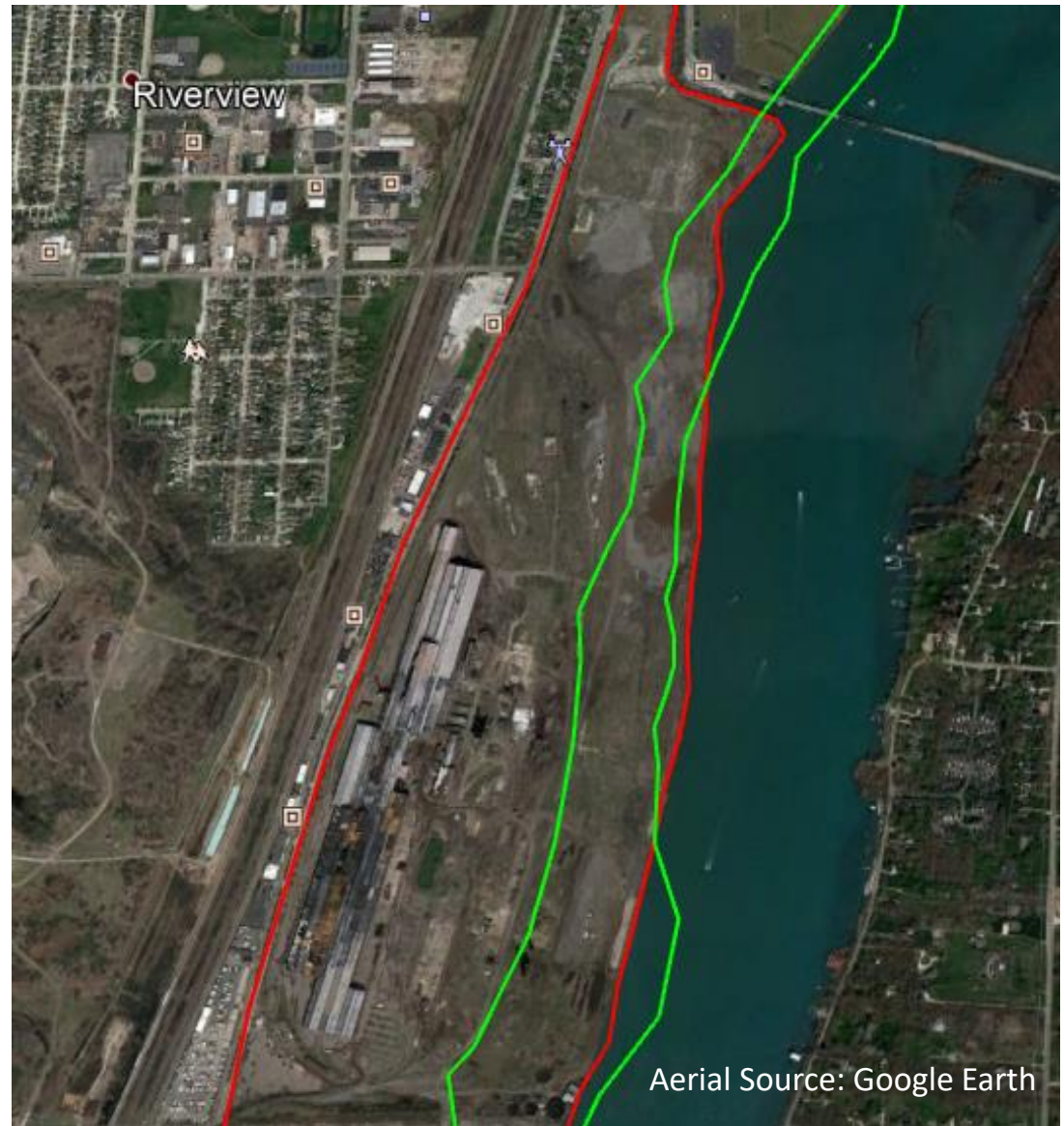


1860 Trenton Map
overlaid on 2019 Google
Maps Aerial



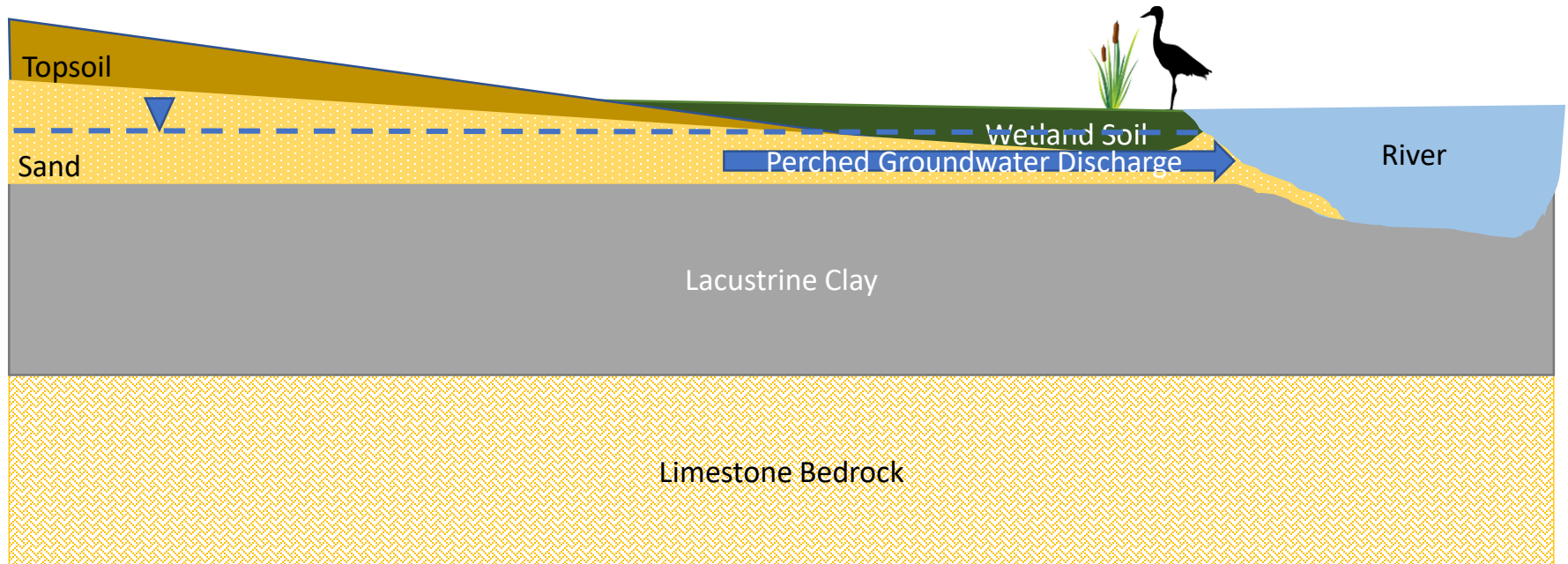
— Outline of McLouth
Trenton Site

— Outline of 1860's
Wetland Area

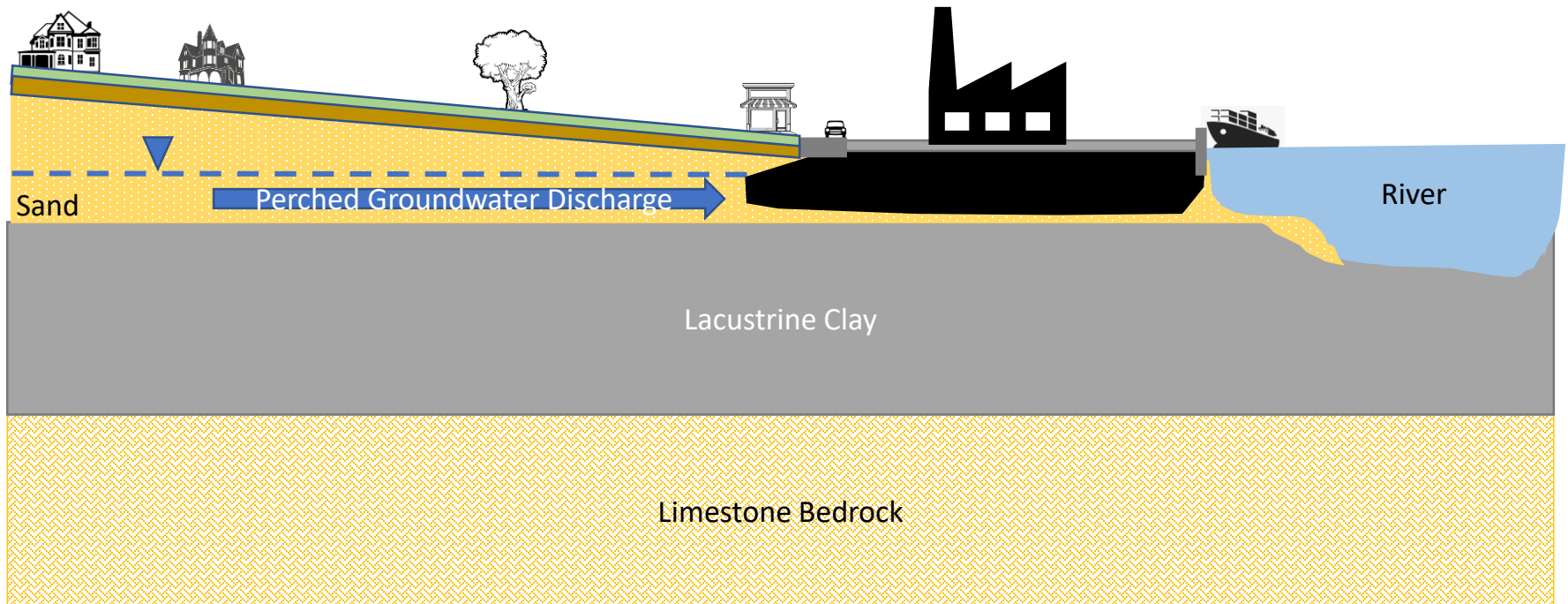


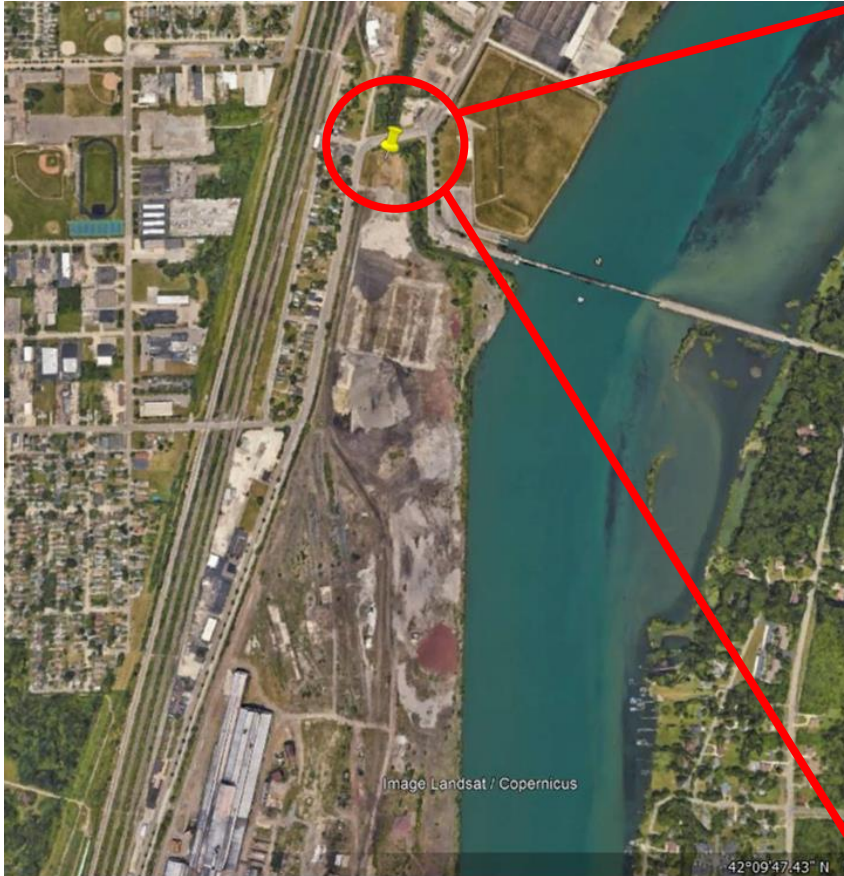
Aerial Source: Google Earth

Conceptual Riverside Geological Cross Section



Conceptual Post Industrialization Geological Cross Section







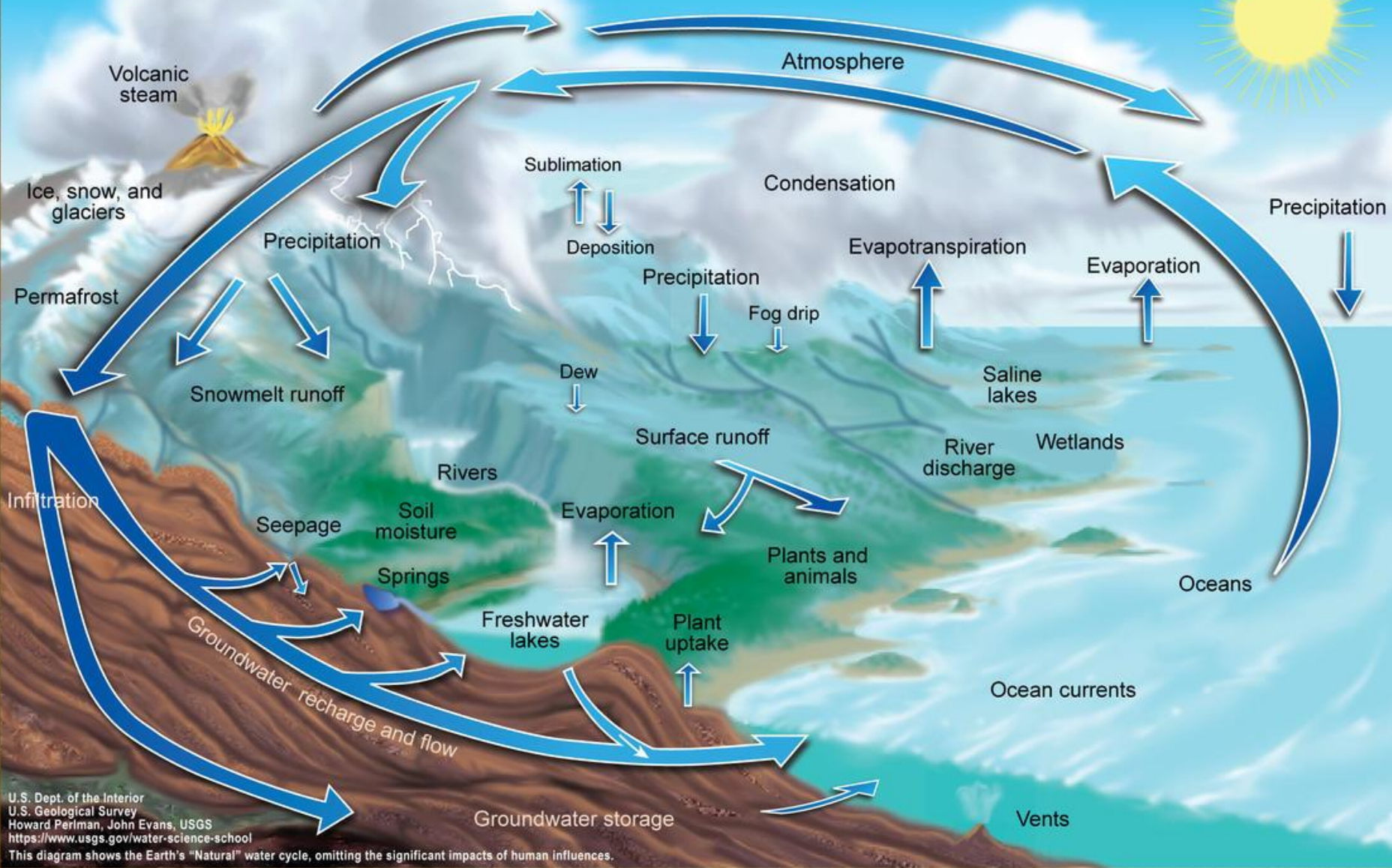
Groundwater 101

Nathan R. Erber
Geologist
Hazardous Waste Section
Materials Management Division
EGLE

517-256-6063

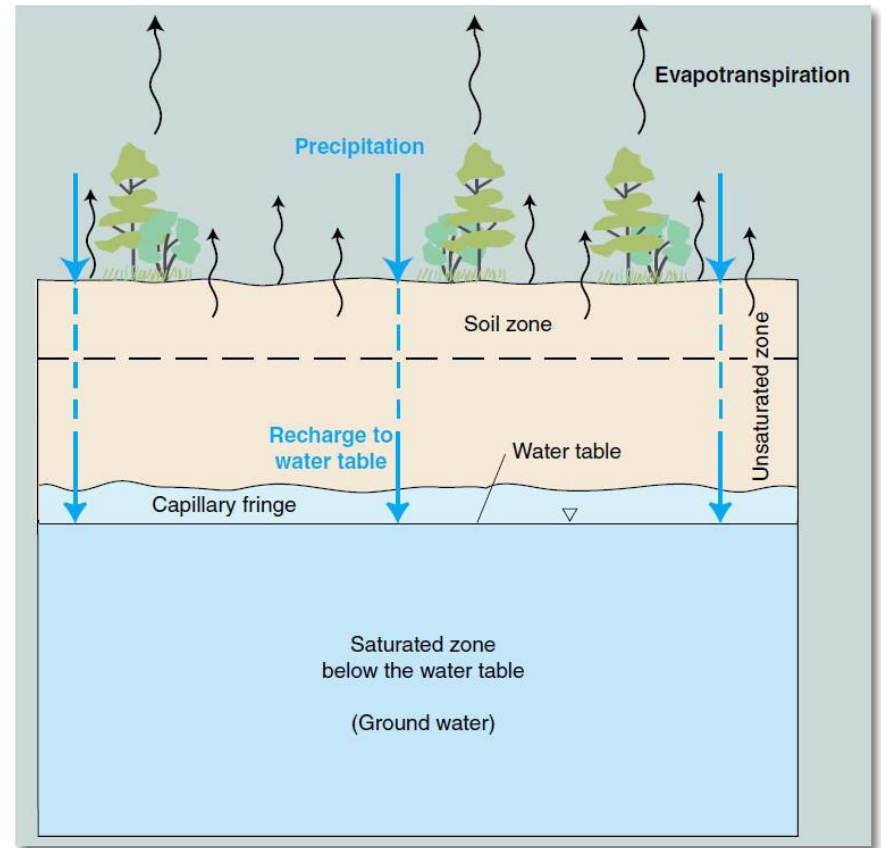
erbern@michigan.gov

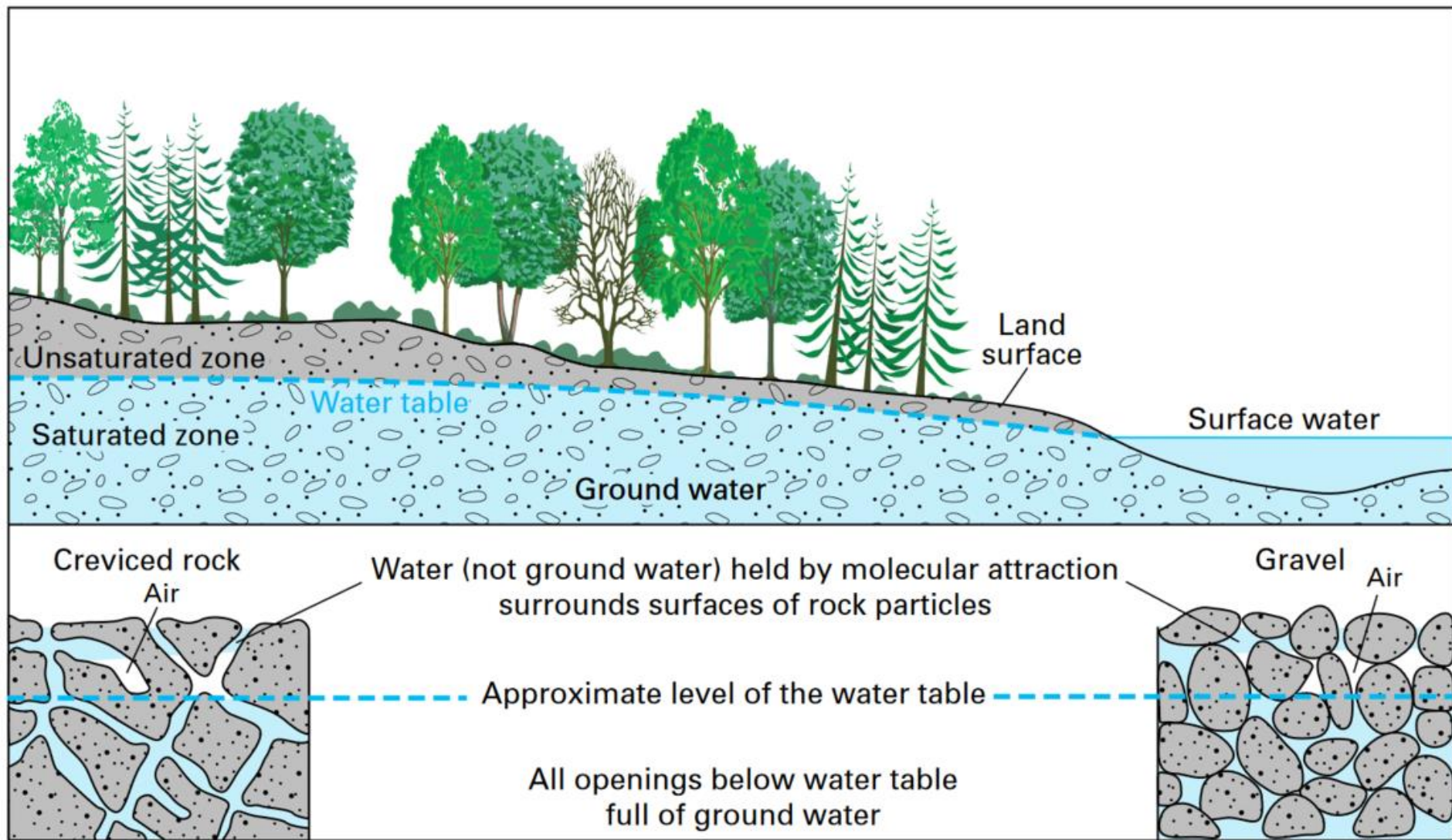
The Water Cycle



What is Groundwater?

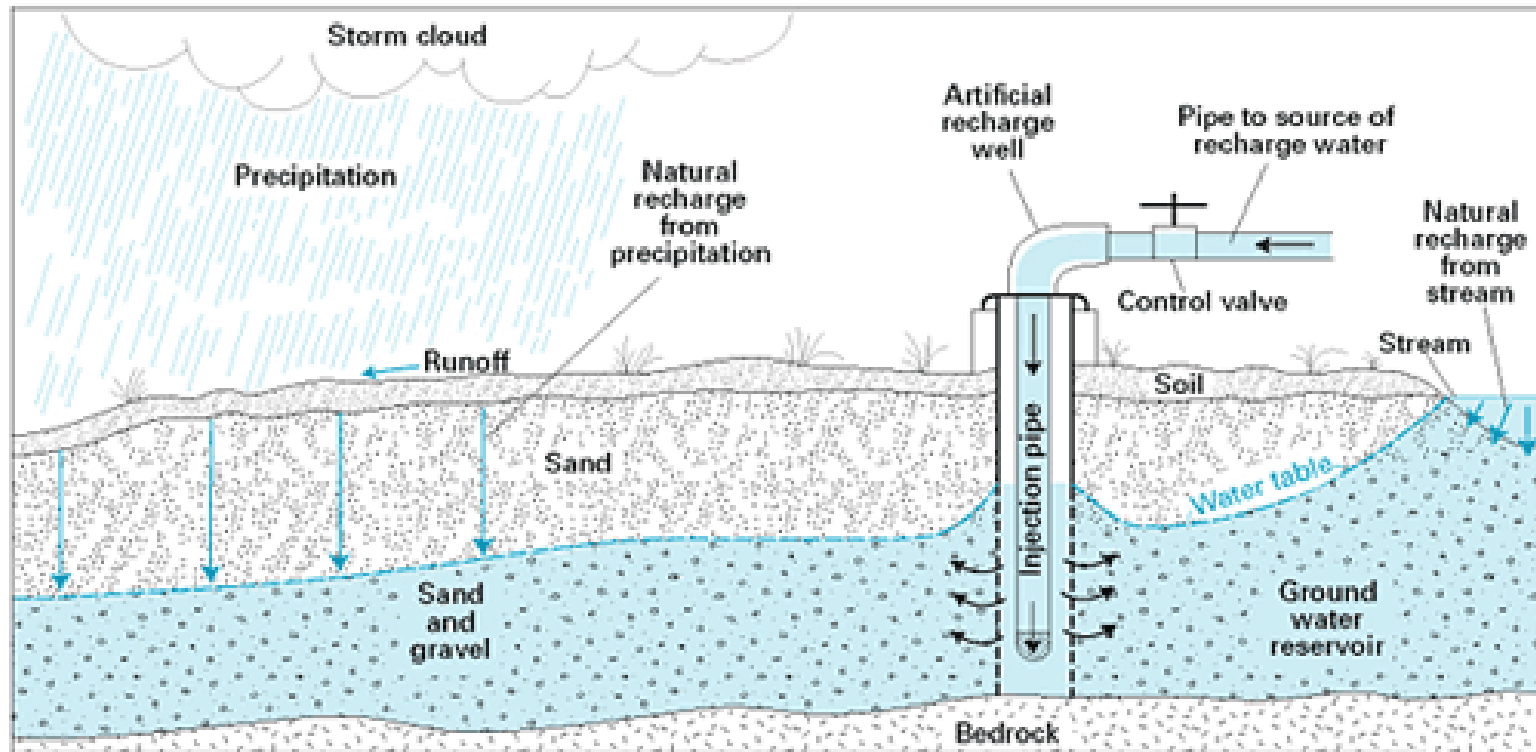
- Groundwater is water that exists underground in saturated zones beneath the land surface.
- Groundwater fills the pores and fractures in underground materials.
 - Sand, gravel, bedrock.
 - Think of a sponge.





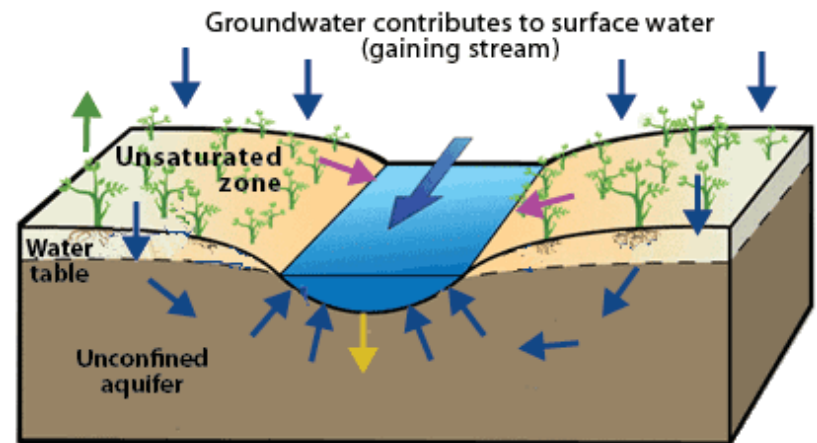
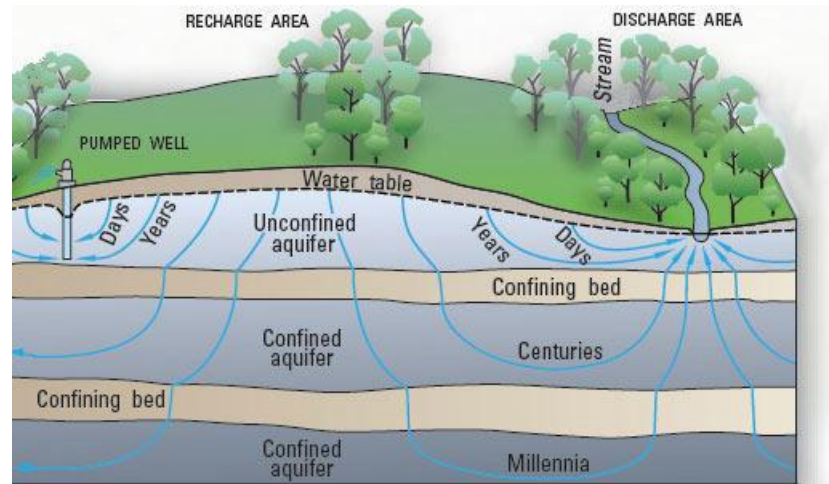
How ground water occurs in rocks.

Groundwater Infiltration

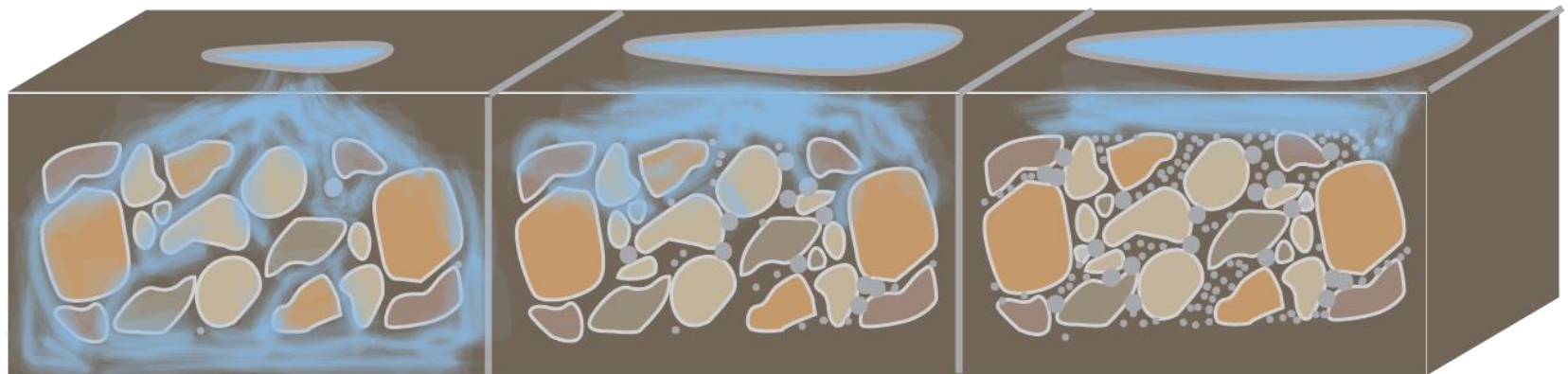
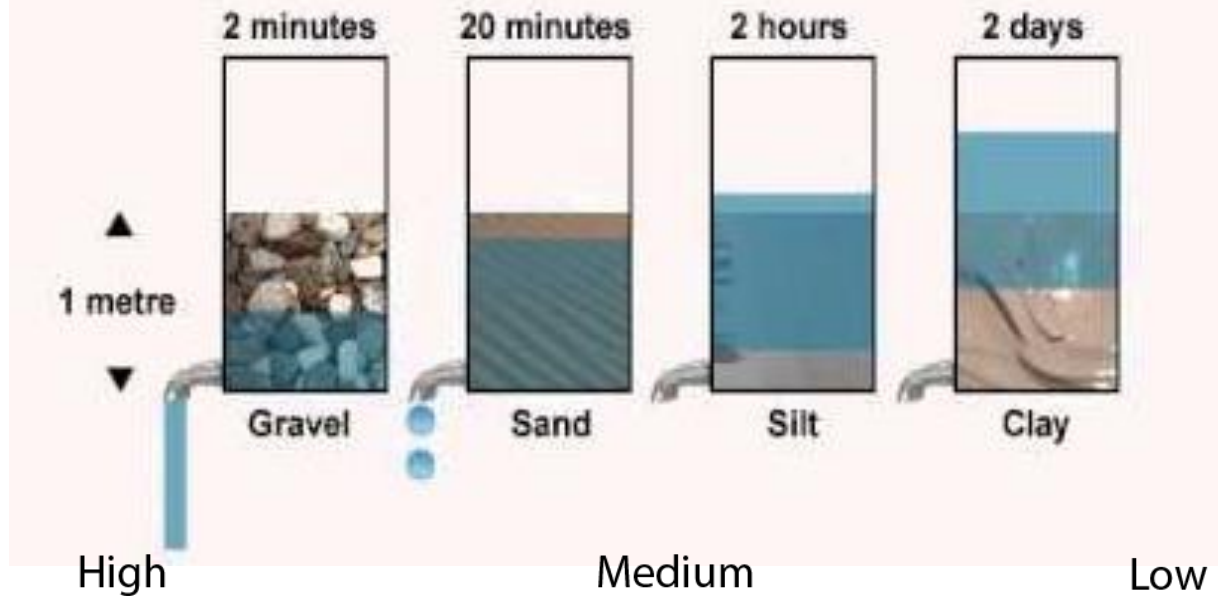


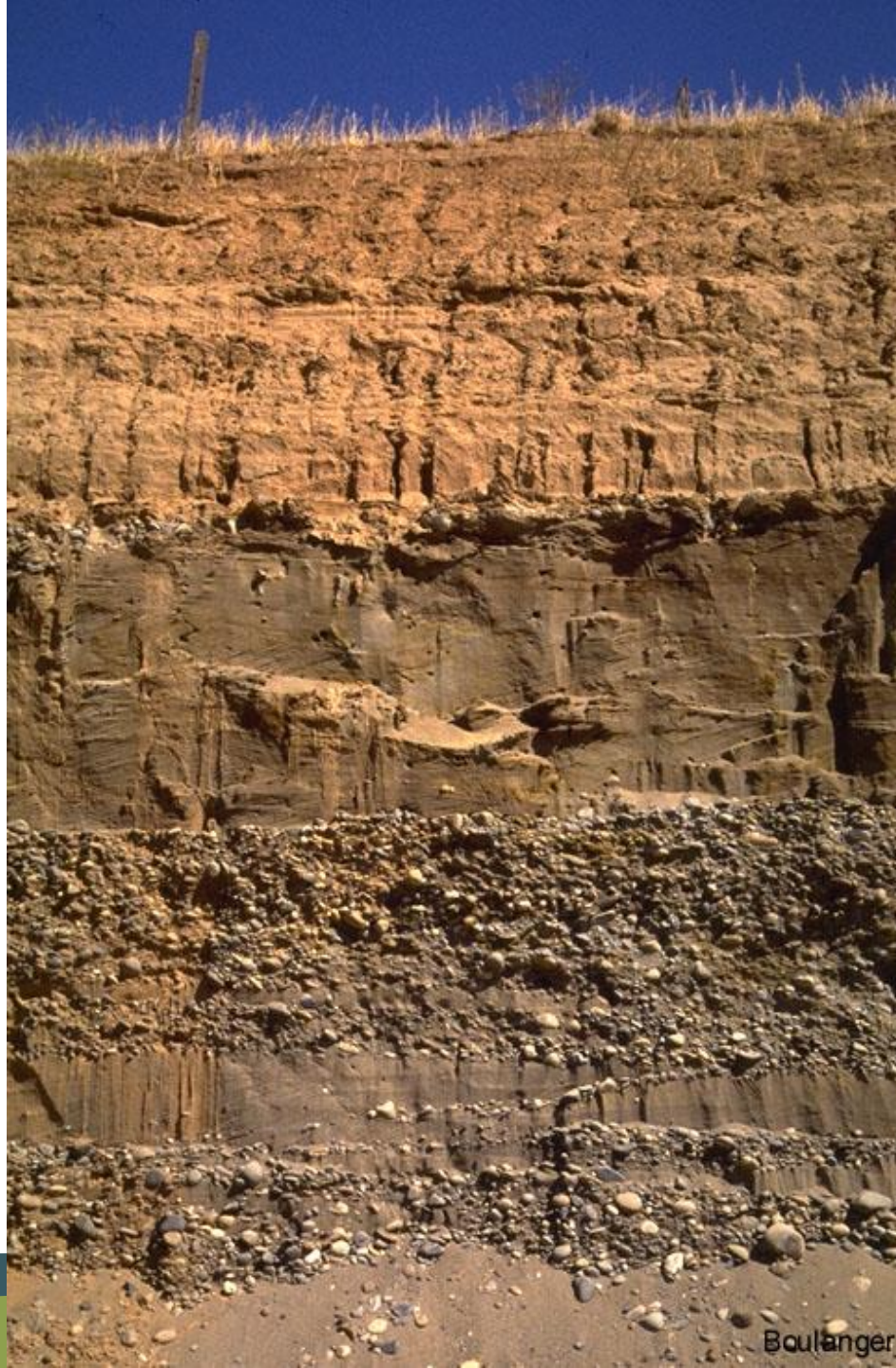
Groundwater Flow

- Groundwater flow is determined by:
 - **Permeability**: how easy or difficult it is for water to move through material.
 - **Porosity**: the amount of open space in the material.

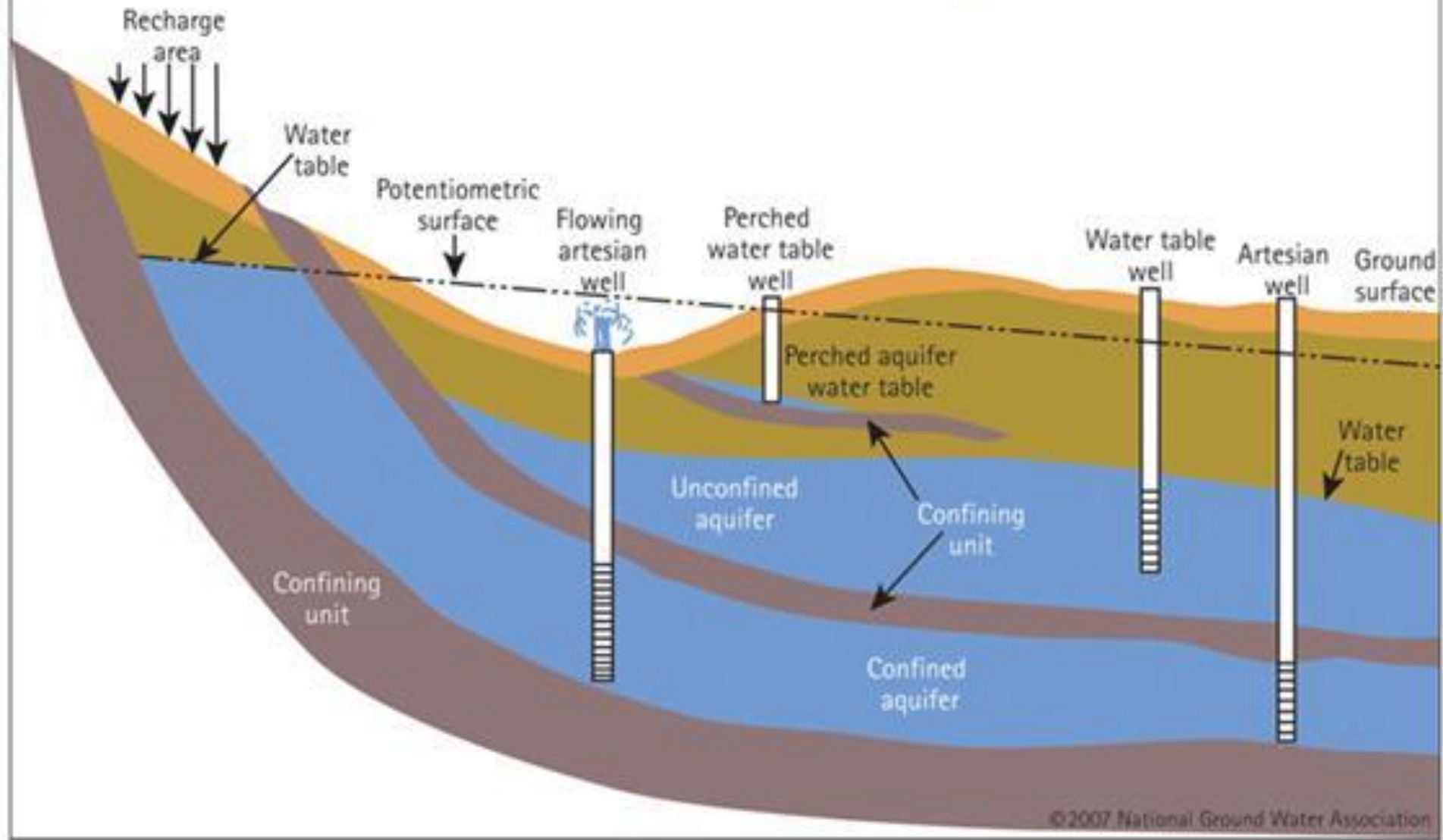


Permeability



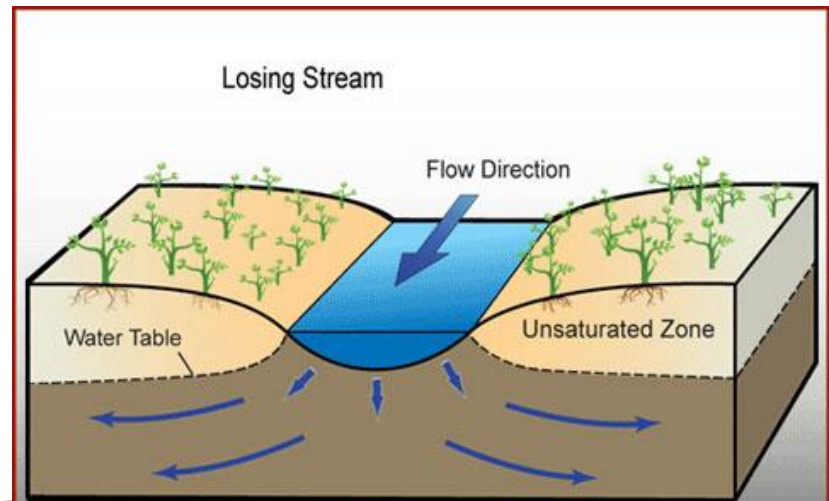
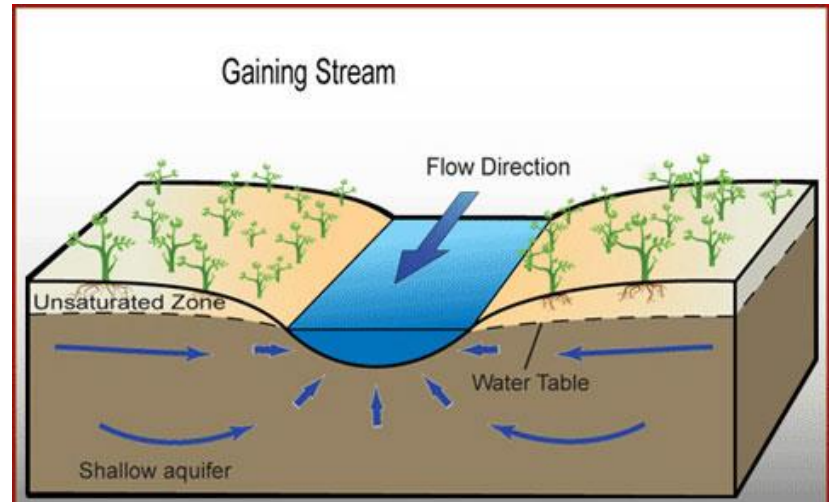


Confined/Unconfined Aquifers



Groundwater and Streams/Rivers

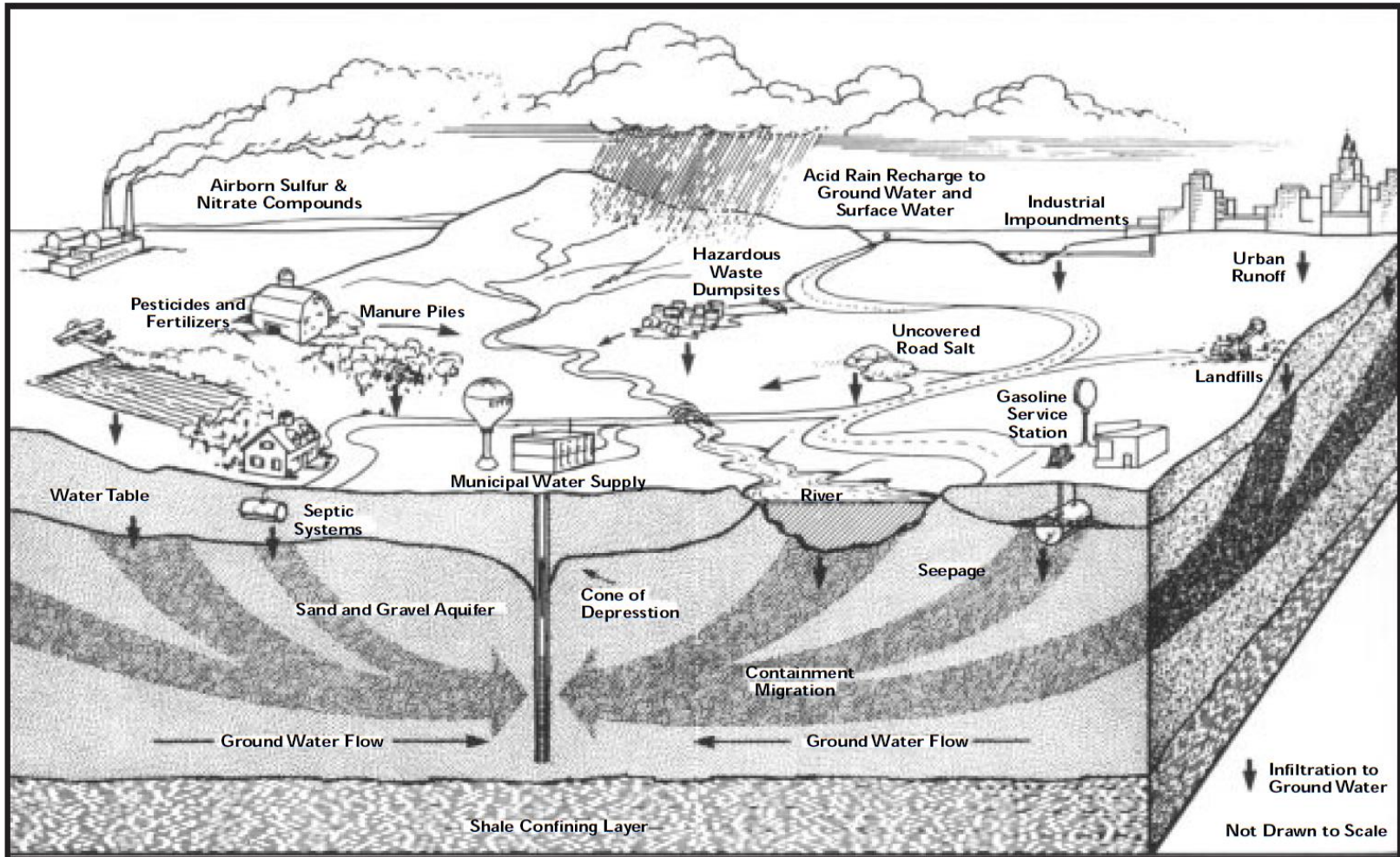
- Interaction takes place in three basic ways:
 - streams gain water from inflow of groundwater through the streambed (gaining stream),
 - streams lose water to groundwater by outflow through the streambed (losing stream), or
 - they do both, gaining in some reaches and losing in other reaches.



Groundwater Investigations

Figure 2

SOME POTENTIAL SOURCES OF GROUND WATER CONTAMINATION

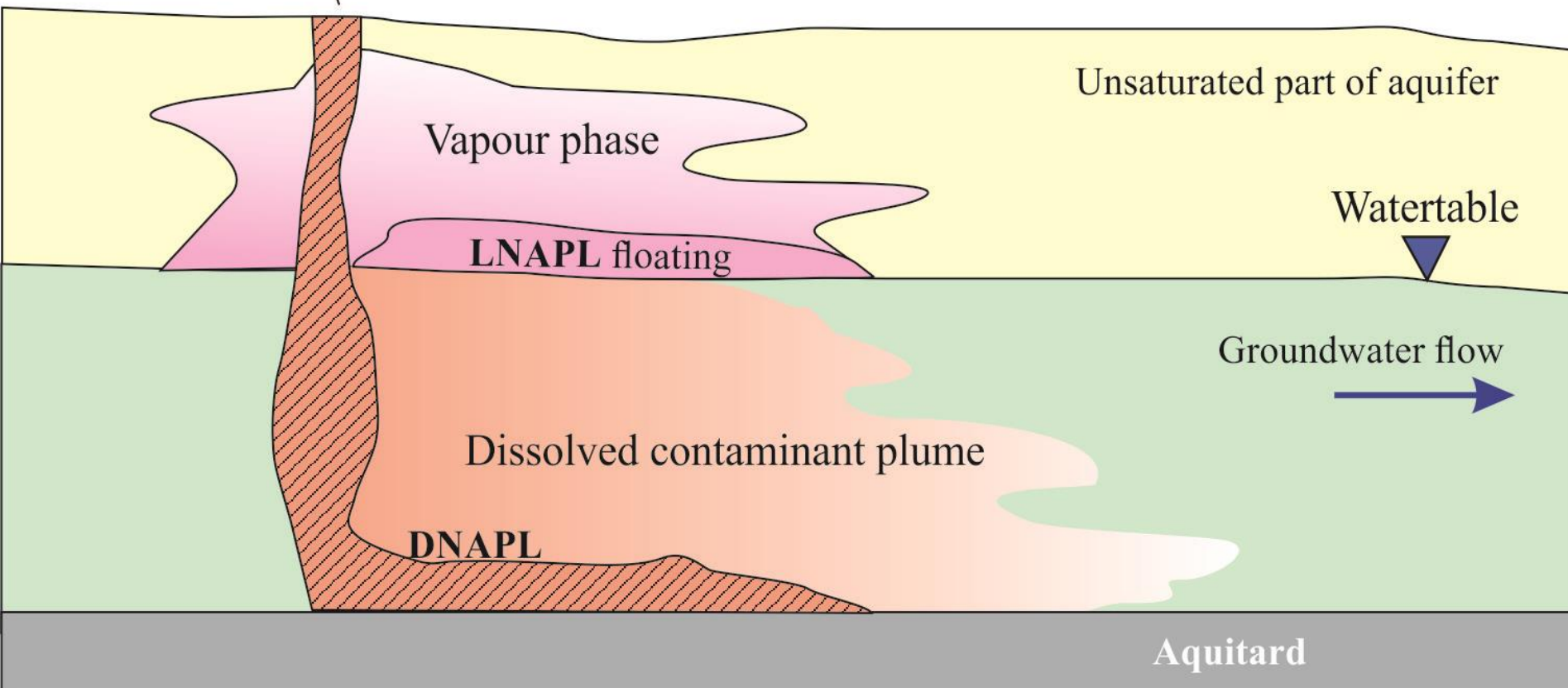


Source: Paly, Melissa and Lee Steppacher. *The Power to Protect: Three Stories about Ground Water*. U.S.E.P.A. Massachusetts Audubon Society and NEIWPCC.

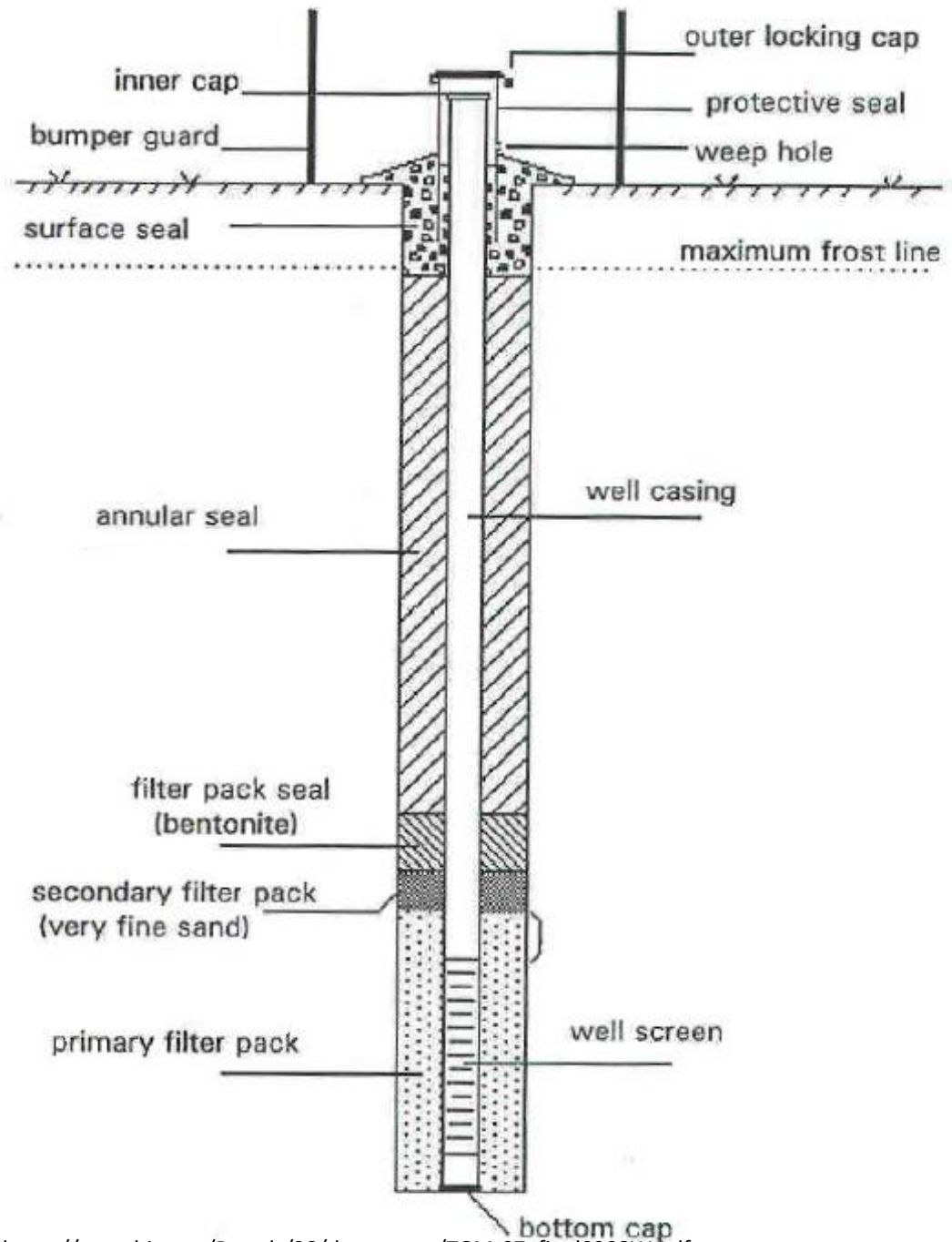
Disposal site
spill, leakage

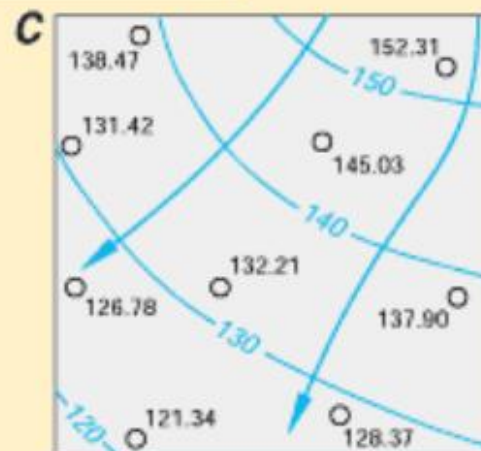
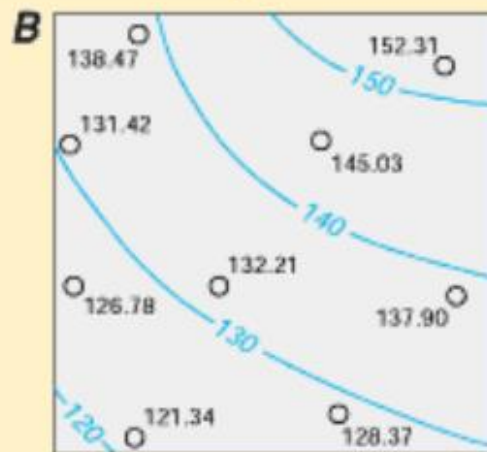
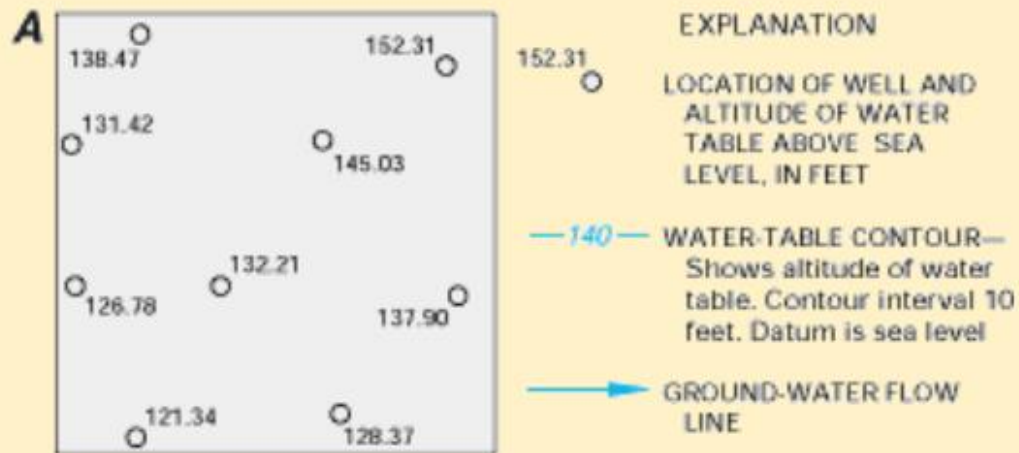
LNAPL = Light non-aqueous phase liquid (e.g. petroleum, benzene)
pronounced 'ell napple'

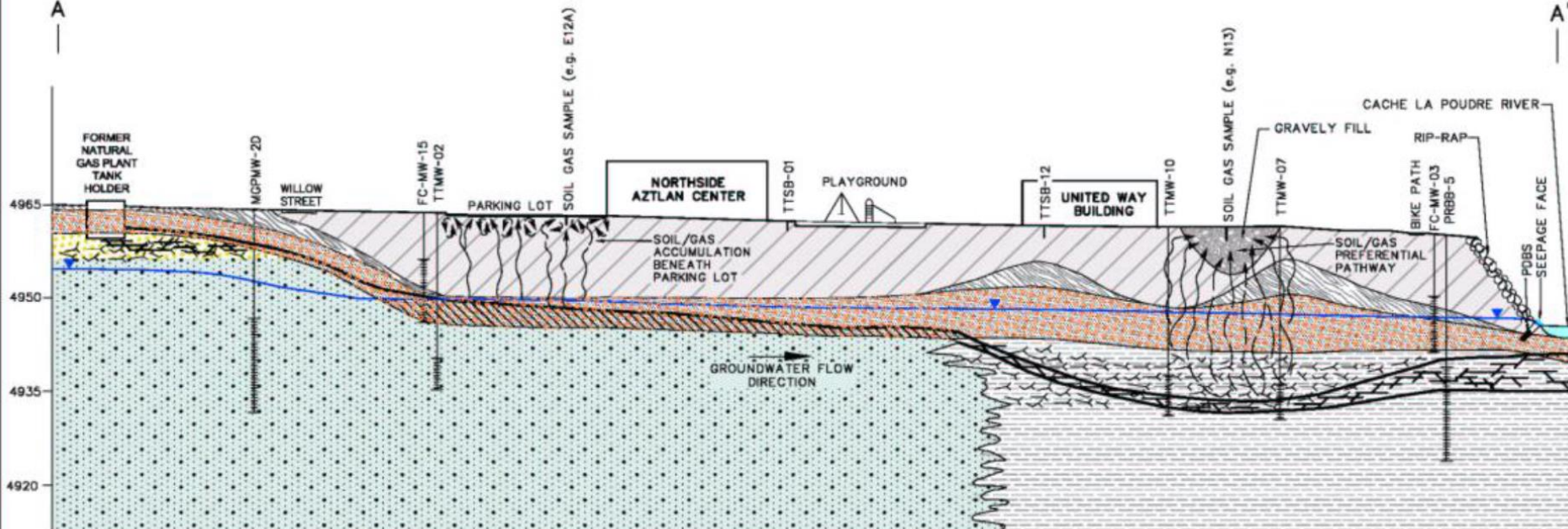
DNAPL = Dense non-aqueous phase liquid (e.g. coal tar, creosote
Trichlorethylene (solvent))
pronounced 'dee napple'



Organic contaminants, like petroleum fuels and solvents may be present as a free liquid, dissolved liquid (in water) and as vapour





SW
ANE
A'**LEGEND**

- WATER TABLE (APPROXIMATE)
- POST-PINEY CREEK ALLUVIUM (UPPER HOLOCENE)
- BROADWAY ALLUVIUM (PLEISTOCENE)
- MASSIVE GLAUCANITIC SANDSTONE (PIERRE SHALE)
- LAMINATED SILTY SANDSTONE/SILTSTONE (PIERRE SHALE)
- LAMINATED, FRACTURED SILTY SANDSTONE (PIERRE SHALE)
- LANDFILL MATERIAL
- DNAPL-COAL TAR
- HIGHLY WEATHERED FRACTURED SANDSTONE (PIERRE SHALE)
- DENSE NON-AQUEOUS PHASE LIQUID (DNAPL)
- PASSIVE DIFFUSION BAG SAMPLER
- WELL SCREEN INTERVAL
- COAL TAR

NO SCALE
HORIZONTAL VERTICAL
1:5 APPROXIMATE VERTICAL EXAGGERATION

POUDRE RIVER SITE
FORT COLLINS, COLORADO

**FINAL CONCEPTUAL SITE MODEL
AND CROSS-SECTION**

U.S. EPA REGION VII
IN COOPERATION WITH
BROWNFIELDS TECHNOLOGY SUPPORT CENTER



Questions?